

Scientific Montessori Equipments

The Knobbed Cylinders

MATERIAL:

4 wooden blocks each block contain ten cylinders each with a knob on top

OBJECTIVES:

1. To develop the child's visual perception of dimension.
2. To develop the coordination of movement.
3. To provide controlled experiences of seriation.
4. To give the child's basic language, important in mathematics.
5. To prepare, indirectly the child for writing by strengthening the thumb, index finger and middle finger, these being the fingers that later control the pencil.

PRESENTATION:

Individual exercises, which are done at a table. It is not necessary to present the cylinder blocks in any particular order. The teacher sits beside the child and places one cylinder block in front of him. Then the teacher carefully takes out each cylinder holding the knob of each between the thumb and first two fingers. The teacher mixes the cylinders on the table. After a short pause she replaces them in their correct socket carefully and deliberately choosing them in order of size.

EXERCISE 1: The child may choose to do the exercise as presented using one block at a time until he can easily do all four blocks separately.

EXERCISE 2: The child repeats the exercise using two blocks together and they are placed in form of an inverted "v".

EXERCISE 3: The child repeats the exercise using three blocks together and they are placed in the form of triangle.

EXERCISE 4: The child repeats the exercise using four blocks together and they are placed in the form of a square.

CONTROL OF ERROR: Each cylinder has a correct socket and if the child incorrectly replaces a cylinder than the exercise cannot be completed.

LANGUAGE: High, Higher, Highest, As High As, Not As High As, Lower, Tall, Taller, Tallest, As Tall As, Not As Tall As, Thick, Thicker, Thickest, As Thick As, Not As Thick As, Thinner, Deep, Deeper, Deepest, As Deep As, Not As Deep As.

AGE: Approximately 2 ½ years onwards.



Scientific Montessori Equipments

THE PINK TOWER

MATERIAL:

Ten pink wooden cubes varying in sizes.

A mat, A Wooden tray.

OBJECTIVES:

1. To develop the child's visual perception of dimension.
2. To develop the child's coordination of movement.
3. To provide useful experience of cubes of different sizes, the cubes being an important solid in alter mathematical work.
4. To give the child basic language important in mathematics.

PRESENTATION:

This is an individual exercise, which is done on the floor on the mat. The teacher carefully places the cubes on the mat and then begins to build the tower, placing each cube centrally on the previous one. When the tower is built, pause for a moment and then take it down and invite the child to build it. It is important to hold each cube so that the fingers and thumb grasps four faces. The reason for this is to give the child a muscular impression of the size of each cube.

EXERCISE:

The child may choose to build the pink tower.

PRESENTATION:

When the child is competent at building the complete tower by placing one cube centrally on another, he can be invited to build a tower, which has two flat walls all the way up. This involves lining up two faces of one cube with similar faces of the cube below. Building the tower in this way allows the child to see that the smallest cube has some relationship to the others, as it will "fit" anywhere on any of the steps of the tower. The teacher shows the child how to build the tower in this way.

CONTROL OF ERROR:

If the tower is very badly built it will fall down and this will act as a control of error. If, however, the child only makes a slight error the procedure is for the teacher to show him the correct way again, at a later time.

LANGUAGE:

Large, Small, Big, Little, Larger Than, Smaller Than, Largest, Smallest.

AGE:

Approximately 2 ½ years onwards.



Scientific Montessori Equipments

The Broad Stairs

MATERIAL:

Ten broad wooden prisms, which are all of the same length but vary in height and breadth.

OBJECTIVES:

1. To develop the child's visual perception of dimension.
2. To develop the child's coordination of movement.
3. To prepare the child indirectly for mathematics by showing the relationship between the prisms and by developing the concept of seriation.
4. To give the child basic language important in mathematics.

PRESENTATION:

This is an individual exercise done on the floor on a mat. The teacher carefully places the prisms on the mat and then begins to build a stair beginning with the smallest prism. When the stair is built, pause for a moment and then mix the prisms and invite the child to build it. It is important to hold the prisms across their breadth so that a muscular impression of the size is felt.

EXERCISE:

The child is invited to build the stair. Once he has accomplished this, the teacher can show him the relationship between each prism by taking the smallest prism and moving it up the stairs.

CONTROL OF ERROR:

The eye act as a control of error but the act of running a hand either up or down the stair helps the child to realize an error.

LANGUAGE:

Broad, narrow, broader, narrower, broadest, narrowest, thick, thin, thinner, thinnest.

AGE:

Approximately 3 years onwards.



Scientific Montessori Equipments

THE COLOUR BOX 1 & 2

MATERIAL:

A box containing six tablets, two blue, two red and two yellow (the primary colours)

OBJECTIVES:

1. To develop the child's visual perception of colour.
2. To teach the child the names of colour.
3. To give the child experience in matching.
4. To indirectly prepare the child for control of pencil or a pen.

PRESENTATION:

This is an individual exercise, which should be done on a natural Coloured table. The teacher takes out the colour tablets and mixes them on the table. She then deliberately picks up one tablet and ask the child to find another tablet the same. Continue in this way until the three pairs of tablets are matched.

EXERCISE:

The child pairs the tablets.

CONTROL OF ERROR:

The eye controls the error.

LANGUAGE:

Blue, red, yellow.

AGE:

Approx 2 ½ years onwards.

NOTE:

The Colour Tablets should be held between the thumb, the index finger and the middle finger. This is direct preparation for holding a pencil.



The Colour Box 2

MATERIAL:

A box containing 22 tablets, two of each of the following colours blue, red, yellow, orange, green, purple, pink, gray, brown, white and black. The material is used with exactly the objectives, and is presented in the same manner as for the COLOUR BOX 1.



Scientific Montessori Equipments

The Long Rods

MATERIALS:

The red wooden ten rods all the same thickness but varying in length. Each rod increase in length by the length of the smallest.

OBJECTIVES:

1. To develop the child's visual and muscular impression of length.
2. To develop the child's coordination of movement.
3. To provide controlled experiences of seriation.
4. To give the child basic language important in mathematics.

PRESENTATION:

This is an individual exercise, which is done on the floor on mat. The teacher carefully places the rods on the mat and then begins to build the stair, starting either with the longest or the shortest rod. It is important to show the child how to feel along the rods each time so that he gets a muscular impression of length.

Exercise1: The child may choose to build a stair.

Exercise2: Once the child can build the stair of 10 easily, show him how to move the smallest rod up the stair and discover the relationship between each rod.

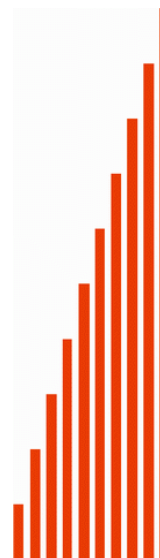
CONTROL OF ERROR: The eyes act as a control of error.

LANGUAGE:

Long, Short, Longer, Shorter, Longest, Shortest, Longer Than, Shorter Than.

AGE:

Approx 2 ½ years onwards.



Number Rods

MATERIAL:

Ten wooden rods varying in lengths. The first is coloured red and the second is coloured in blue.

OBJECTIVES:

1. To introduce the child to counting up to ten using fixed quantities that is three as whole.
2. To make the child aware of the quantitative relationship between the numbers e.g: two is more than one and three is more than two etc.
3. To make the child aware of sequence of numbers 1 to 10.
4. To make the child aware of the concept of numbers as an aggregate of one.

PRESENTATION

1. The teacher asks the child to build a stair with rods. Providing the child has experience with the long rod at the sensorial level he will be able to do this.
2. Using the "the three lesson plan" the teacher introduces the names one, two, three, in association with the quantities one, two, three. Gradually, the child learns up to 10.

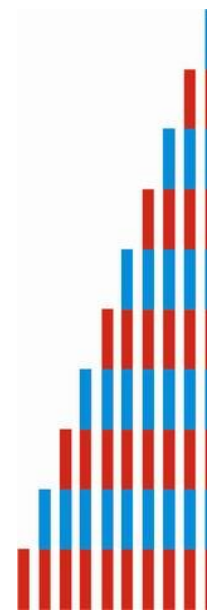
EXERCISE: The child can build the stair and can count from 1 to 10.

CONTROL OF ERROR:

If the stair is correctly build the child will be able to name.

AGE:

Approx 3 years onwards.



Scientific Montessori Equipments

The Spindle Boxes

MATERIALS:

Two wooden boxes with five compartment each. The numerals 0 to 4 and 5 to 9 written at the back of the boxes, 45 spindles.

OBJECTIVES:

1. To give the child further practice in associating each numeral with the right number situation. With this material however, there is not as much as control as the quantities are not fixed.
2. To introduce the child to the concept of zero and show how the symbol is written.



PRESENTATION:

The teacher and the child remove the spindles from the box placing them neatly in a row in front of the spindle box, with a controlled hand on the table, the teacher points to the zero and explains what it means, saying “we don’t place any spindles in this compartment”. The teacher then points to the 1 and asks the child to place the correct number of spindle in the compartment.

EXERCISE:

When the child has understood the exercise he can work by himself.

CONTROL OF ERROR:

There are exactly the correct number of the spindles of the box, so if when the child gets to 9, there are not enough spindles or there are too many he knows he has made a mistake.

The Dressing Frames

MATERIALS:

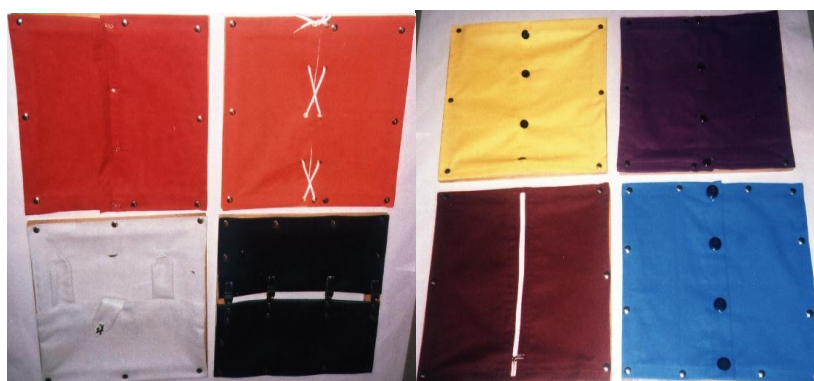
The dressing frames are 8 in total e.g: a frame of big buttons, press buttons, small hook and eye, big hook and eye, lacing, zip, buckles.

OBJECTIVES:

To teach self-reliance, self control and coordination of movements.

PRESENTATION:

1. Present the frame to the child in its complete state.
2. Take the two sides apart slowly and deliberately and then reassemble it in the same way.
3. Let the child count the buttons, feel the fabrics etc. Tell him the names of the things involved and what they are used for.



Scientific Montessori Equipments

The Sound Boxes

MATERIAL:

Two wooden boxes each containing 6 cylinders, which are filled with different objects so that when shaken they have a different sound. One box has a red lid and red cylinders and the other a blue lid and blue cylinders. The red set matches the blue set.



OBJECTIVES:

1. To refine the child's auditory sense. The exercises develop both the auditory perception and the auditory memory.
2. To give the child experience in matching.

PRESENTATION:

This is an individual exercise.

1. The teacher places one State of sound boxes in front of the child .she shows the child how to hold and shake the boxes and allows the child to shake the boxes so that he becomes familiar with them.
2. The teacher shakes a sound box and asks the child to find a box that matches. It is advisable to start with three pairs only and progress to six pairs, choosing three that contrast the most.

LANGUAGE:

Loud, soft, louder, softer, louder than, softer than, loudest, softest, quiet, quieter,

AGE:

Approx 3 years onwards.

Moveable Alphabets

MATERIALS:

A large wooden box containing 'cut out' letters in card board. The vowels are in the blue, the consonants in red.

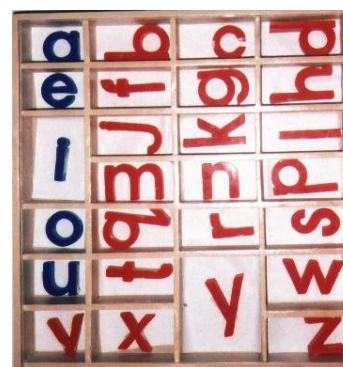
2 boxes of objects: set 1-3 letters phonetic. Set 2 longer phonetic.

OBJECTIVES:

1. To evaluate whether a child can remember a word sufficiently well to form it himself from letters.
2. To evaluate whether he can hear the sound in the words learnt.

PRESENTATION:

The teacher gives the child a practice in finding letters e.g. 'b', 'c' etc. The teacher suggests a word like dog and asks child what sounds he can hear. The child finds the sounds and the teacher places them in order. The next stage is for the child to work by himself with a box of objects and build the words.



AGE:

4 years onwards.

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Touch Boards

MATERIALS:

Touch boards 1-2 different textures.

Touch boards 2-4 different textures.

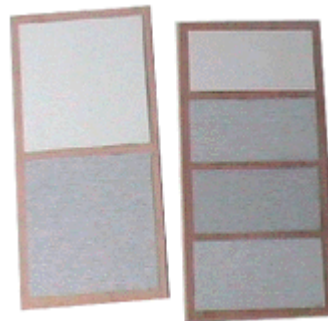
OBJECTIVES:

1. To isolate the sense of touch and make the child more aware and sensitive to the different textures in his environment.

2. Language development.

PRESENTATION:

Individual exercise done at a table. The child should wash his hands in warm water before using the boards. Teacher presents the board 1 and then board 2. Show the child how to feel the different textures very lightly with the tips of his fingers from top to bottom, ask him to close his eyes or use a blindfold.



LANGUAGE:

Teach appropriate vocabulary, e.g: rough, rougher, roughest, smooth.

EXERCISE:

Using the touch tablets the child can do an individual exercise and pair the tablets, He uses a blindfold.

CONTROL OF ERROR:

The wall papers on the tablets are different in appearance so that the child can correct his mistakes.

AGE:

2 ½ years onwards

Place Value Abacus

OBJECTIVES:

1. To physically demonstrate the structural composition of numbers as thousands, hundreds, tens and units.

2. To develop arithmetical skills.

PRESENTATION:

The teacher Place the abacus of tens and units before the child and explains it. Once the concept is understood the other two abacuses may be presented to explain hundreds, tens and finally thousands.

EXERCISE:

1. The teacher should call out a number and the child should demonstrate by threading the correct number of beads on the appropriate abacus.

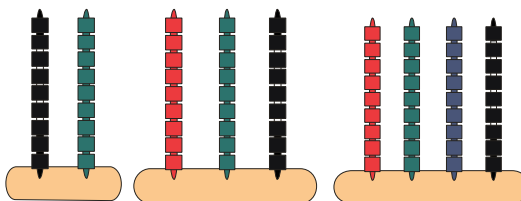
2. Conversely the teacher should thread the beads on the abacus to make a number and ask the child to write it down on a piece of paper.

CONTROL OF ERROR:

The child can be physically shown any mistakes that might have been made.

AGE:

4 years onwards.



Scientific Montessori Equipments

Sand Paper Urdu Letters

MATERIAL:

36 sand paper URDU letters.

OBJECTIVES:

To teach the child the written symbols

To prepare the child for writing.

PRESENTATION:

This is an individual exercise. The teacher takes the first three letters, demonstrates the tracing of the shape of a letter with the first two fingers of the hands and let the child trace in the same way. She continues the exercise with each child by using the “three period lesson plan”.



CONTROL OF ERROR:

The eye and fingers act as a control of error.

AGE:

3 years onwards.

Sand Paper Letters English

MATERIAL:

26 sand paper letters from a-z.

OBJECTIVES:

To teach the child the written symbols.

To prepare the child for writing.

PRESENTATION:

This is an individual exercise. The teacher takes the first three letters demonstrates the tracing of the shape of a letter with the first two fingers of the hands and let the child trace in the same way. She continues the exercise with each child by using the “three period lesson plan”.

CONTROL OF ERROR:

The eye and fingers act as a control of error.

AGE:

3 years onwards.



Scientific Montessori Equipments

The Knobless Cylinders

MATERIAL:

4 sets of cylinders, each set is a different colour, so that they do not get mixed up.

1. Cylinders vary in height and diameter.
2. Cylinders vary in cylinders vary in height and diameter.
3. Cylinders vary in diameter.
4. Cylinders vary in height.
5. Mat

OBJECTIVES:

1. To develop the child's visual perception of dimension.
2. To develop the child's coordination of movement.
3. To provide controlled experiences of seriation.
4. To give the child the basic language important in mathematics.

PRESENTATION:

These are individual exercises, which can be done on the floor or on the table, as is comfortable for the child, the teacher takes one set and first shows the child how to grade them in a line and how to build them in a tower. Later, he is allowed to use two or more sets together.

EXRECISE:

1. The child grades the cylinders.
2. The child builds the towers with the cylinders.

CONTROL OF ERROR:

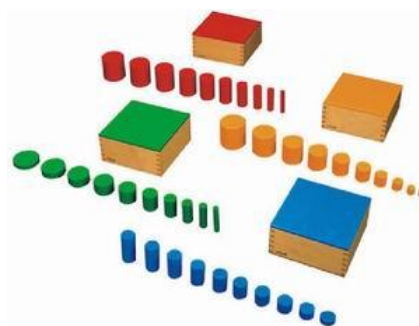
The eye acts as a control of error.

LANGUAGE:

High, Higher, highest, as high as, not as high as, lower, taller, tallest, as tall as, not as tall as, thick, thicker, thickest, as thick as, not as thick as.

AGE:

Approx 3 years onwards.



Scientific Montessori Equipments

Cards And Counters

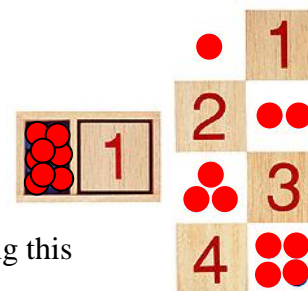
MATERIALS:

A set of individual cards with the numerals 1-10.

A box of 55 counters, all the same colour.

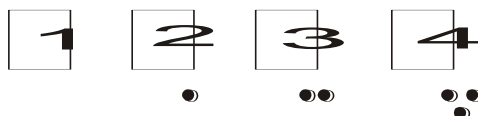
OBJECTIVES:

1. To give the child further practice in counting and associating the correct number of objects with the numerals.
2. To teach the child, place the numerals in the correct order. Using this material there is no control over the order.
3. To introduce the child to the idea of add and even numbers.



PRESENTATION:

The teacher mixes the cards on the table and gives the box of counters to the child. The teacher then asks the child to find 1 and asks him, “How many counters shall we place underneath it?” Then she asks him if he knows what number comes after 1. The child finds 2 and places counters underneath. The teacher shows the child how to place the counters in a certain pattern.



When the exercise is completed the child is asked if he can notice any similarity in the patterns. The teacher introduces the name “odd number”

CONTROL OF ERROR:

In the original Montessori apparatus there is no control of error. If the child finds difficulty in doing this exercise he should be given plenty of practice with earlier material. However, a set of control cards can be provided to help the child through this stage. The teacher should remember the need for children to experience different arrangement of a given number of objects.



The Touch Fabrics

MATERIALS:

A box containing two of each of a variety of fabrics, e.g: silk, cotton, linen

OBJECTIVES:

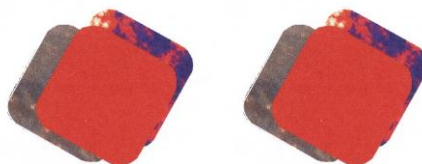
1. To isolate the sense of touch and encourage the child to recognize different textures.
2. Language development.

PRESENTATION:

Individual exercise done on the table. The child should wash his hands with the warm water first. Start with the three most contrasting textures. Lay out and mix the fabrics on the tables. Show the child how to feel with his fingertips and between his fingers and thumb. Tell him to pair the fabrics.

CONTROL OF ERROR: The fabrics are different in appearances and therefore the child can see his mistakes.

AGE: 2 ½ onwards.



Scientific Montessori Equipments

Geometric Solids

MATERIALS:

Geometric solids, cube, sphere, ellipsoid, cylinder, ovoid, 2 pyramids, cone, rectangular prism, triangular prism. A set of bases for the solids.

OBJECTIVES:

1. To make the child familiar with, and to teach, the appropriate mathematical names for the various geometric solids.
2. To make the child aware of the geometric solids that is found in the everyday environment.

PRESENTATION:

This is an individual exercise done at a table. The teacher spreads the felt cloth on the table and taking 2 or 3 solids gives them to the child for him to handle. Then teaches the names by using the “three period lessons plan”. Gradually introduce the other solids and teach names.

EXERCISE 1:

The child is asked to sort the solids into sets e.g: those with straight sides, those with curved sides.

EXERCISE 2:

The child is asked to experiment with the solid and place 1 or 2 together to try from other solids.

EXERCISE 3:

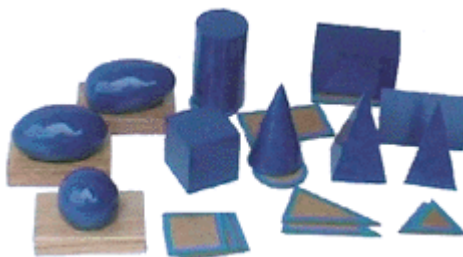
Using the set of bases the child is asked to place to each solid on its base. Using the appropriate language the child is helped to discover which solids have the same bases. The language used is important so that the child realizes the importance of the number of straight edged and curves.

LANGUAGE:

Cube, sphere, ellipsoid, ovoid, pyramid, cone, rectangular prism and triangular prism.

AGE:

Approx 3 years onwards.



Scientific Montessori Equipments

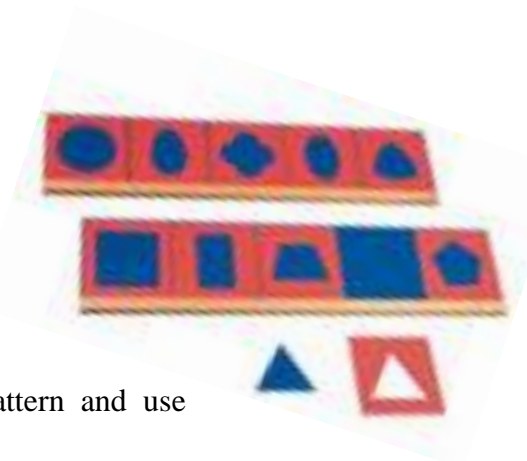
Insets For Design

MATERIAL:

10 geometric shapes in plastic or metal.

OBJECTIVES:

1. To prepare the child's muscles for holding a pencil correctly.
2. To develop control of movement with flexibility.
3. To give the experience in anti-clockwise movements parallel straight lines when filling in shapes, downward and left to right to the clockwise.
4. Indirect preparation for art development of pattern and use of colours.



PRESENTATION:

The teacher asks the child to choose a shape, a piece of colour paper and two different coloured pencils. She shows the child how to hold the pencil correctly, How to draw round the shapes with one colour pencil and how to fill in the shape with controlled straight lines from one side of the outline to the other using the coloured pencil. There are a series of different designs recommended .the child should be encouraged to make his own designs. Never allow the child to scribble in the outlines. If the child persists in scribbling, he is not ready for controlled exercises and he should be allowed to do a lot of free drawings.

EXERCISE:

The child should do exercise as indicated above with all ten shapes.

AGE:

2 years onwards.

Sand Paper Numbers

MATERIAL:

10 sand paper number from 0-9.

OBJECTIVES:

To teach the child the written symbols.

To prepare the child for writing.

PRESENTATION:

This is an individual exercise, the teacher takes the first three letters or numbers, demonstrates the tracing of the shape of a letter/numbers with the first two fingers of the hand and let the child trace in the same way. She continues the exercise with each child by using the "three period lesson plan".

CONTROL OF ERROR:

The eye and fingers act as a control of error.

AGE:

3 years onwards.



Scientific Montessori Equipments

Geometric Tray And Cabinet

MATERIALS:

1. Presentation tray 3 insets-a square, a circle and an equilateral triangle.
2. Geometric cabinet.
 - 1) 6 circles.
 - 2) 6 rectangles.
 - 3) 6 triangles.
 - 4) 6 polygons.
 - 5) 2 curved figures and 4 quadrilaterals.



OBJECTIVES:

1. Preparation for the geometry.
2. Preparation for reading and writing.
3. Co-ordination of movement, language development.

PRESENTATION:

The teacher sits besides the child and removes the insets, placing them opposite so that there appears to be 2 squares, 2 circles and 2 triangles, the teacher feels around the insets and sockets and replaces each in the correct place, using the index and middle fingers.

EXERCISE1: The child does the exercise as presented.

PRESENTATION OF GEOMETRICAL CABINET:

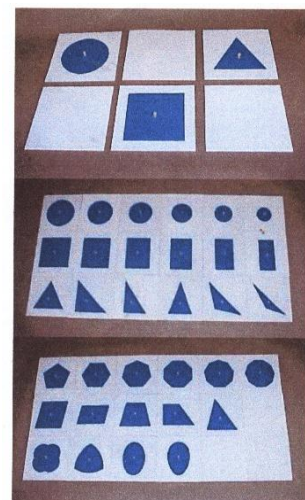
Take out one of the drawers from the cabinet. Show the child how to remove the figures, mix them on the table round each inset and socket in turn and replace the figures.

EXERCISE1: The child can take out a drawer one at a time and do the exercise as presented.

LANGUAGE: Teach the names of all the shapes.

CONTROL OF ERROR: There is a socket for each inset in the tray.

AGE: 3 years onwards.



Maps

MATERIALS:

- Puzzle maps of:
1. The world. (Five Continents)
 2. Pakistan map.

OBJECTIVE:

An introduction to physical and political geography.

PRESENTATION:

The child is allowed to use the puzzles as ordinary puzzles. When he asks about them he can be taught the name of the continents and countries. The child's own continent and country or somewhere he has recently visited is a good starting point.



Scientific Montessori Equipments

The Baric Tablets

MATERIALS:

Three boxes containing three sets of wooden tablets, which vary in weight because they are made of different wood, e.g: plywood, beech etc.

OBJECTIVES:

1. To make the child more aware of materials and weight.
2. To extend the child's vocabulary.

PRESENTATION:

This exercise has to be done with two people, either teacher and child or two children, starting with the two sets that they vary most in weight and then progressing to all three sets, the teacher sits opposite the child. The child is asked then to put out his hands above the table so that his arms are not resting on it. The teacher then places two different tables one on each hand. Then she asks the child to close his eyes and tell her which is the lighter, or which is the heavier? The blindfold may be used. The teacher then proceeds to work through the two sets of tablets until the child has sorted them all into lighter and heavier.



CONTROL OF ERROR: When the exercise is completed and the child removes the blindfold he can see whether or not has sorted the tablets correctly by the colour of the wood used for the tablets.

LANGUAGE: Light, heavy, lightest, heaviest, lighter, lighter than, heavier than.

AGE: Approx 3 years.

Thermic Tablets

MATERIALS:

Tablets made of china tile, metal and wood. There must be a pair of each.

OBJECTIVES:

1. To make the child more aware of the temperature of different materials in his environment.
2. Language development.

PRESENTATION:

Individual exercise done at the table. The child should wash his hands with water before doing the exercise, tell the child to lay his fingers on the tablets for a few seconds and ask if he feels any difference.

EXERCISE:

The child lays out the tablets, puts on a blind fold and pairs them by temperature.

LANGUAGE:

When the child can pair the tablets teach the words, warm, tepid, cold and also the name of the different materials.

CONTROL OF ERROR:

The appearance of the tablet is different so the child will see his mistakes when the blindfold will be removed.

AGE:

2 ½ onwards.



Scientific Montessori Equipments

The Teen Boards

MATERIALS:

- 9 ten bead bars.
- 1 Set of short bead stair.
- A set of cards 1-9.

OBJECTIVES:

To teach the quantities and the symbols 11 to 99.

PRESENTATION:

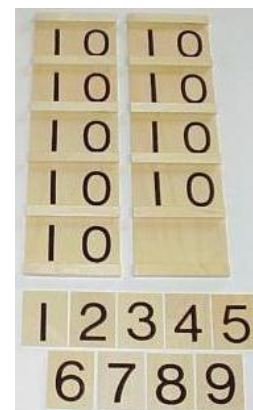
The teacher first presents 11, 12, and 13 by placing a ten bead and a one bead, then a ten bead bar and a two bead bar, then a ten bead bar and a three bead bar. Using the three period lesson plan the child is taught the names “ten and one is eleven”, ten and two is twelve, and how to count on to 19.

CONTROL OF ERROR:

The exact number of beads is provided so that once the child has been taught 11 to 19 he can then practice forming the numbers by him and the number of beads will act as a control of error, then using the teen board and the set of cards the child is shown the symbols for 11 to 19.

The teacher points to the first 10 and asks, “What is this?” when the child replies 10, the teacher slips in the 1 card over the zero and says “this is 11, 10 and 1 make is 11”. Then she shows him 12 and 13 and using the three period lesson plan continues until the child knows 11 to 19.

Next the teacher asks the child to place the beads beside the board and builds the quantities 11 to 19 on the teen board, so that the child associates the numerals with the quantity.



The Ten Boards

MATERIALS:

- 45 ten - beads bars.

OBJECTIVES:

1. To teach the quantities and the symbols 20 to 90.
2. To give the child practice in counting from 11 to 99.

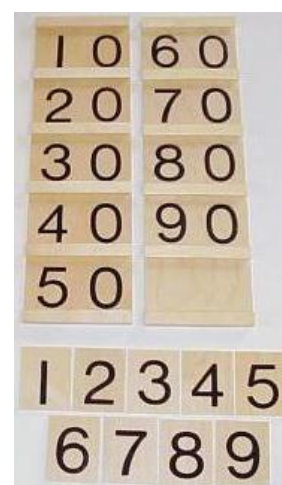
PRESENTATION:

Using the beads only, the teacher first presents 10, 20, and 30.

Using the “three period lesson plan” the child is taught the names and how to count in tens, e.g: ten, twenty, thirty. The next step is to show the child how to build the quantities and associate them with the symbols 20 to 90, by placing the beads beside the board, finally the child can do an exercise counting and making the symbols from 11 to 99.

CONTROL OF ERROR:

The exact numbers of beads are provided so that the child has been taught 20 to 90, he can then practice forming the numbers by him self and the numbers of beads will act as a control of error.



Scientific Montessori Equipments

Binomial Cube

MATERIAL:

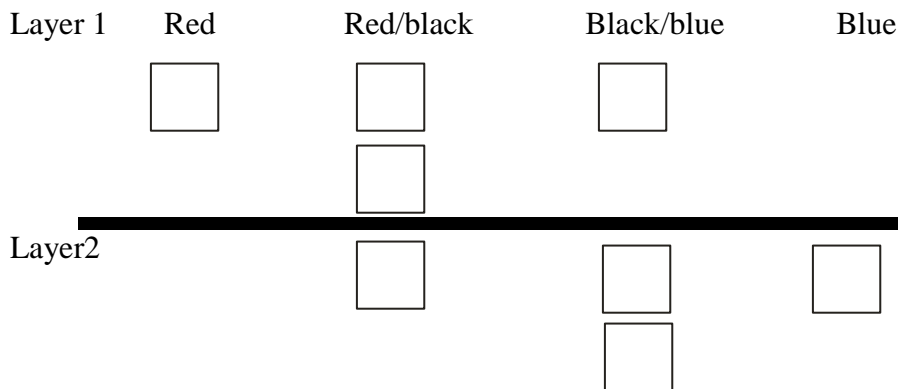
- A box, containing 8 wooden blocks.
- 1 red cube.
- 2 blue cube.
- 3 red and black, rectangular prisms.
- 4 blue and black, rectangular prisms.

OBJECTIVES:

To give the child, a concrete experience in exploring and handling a cube made up of the above formula.

PRESENTATION:

The teacher lays out the cubes from the box in the following pattern that will make it easy for Re-building the cube in two layers using the colour as a guide.



CONTROL OF ERROR

The colours act as a control of error. Also if the cube is incorrectly built it cannot be made into a cube.

LANGUAGE:

Binomial cube.

AGE:

Approximately 3 years onwards.

